

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

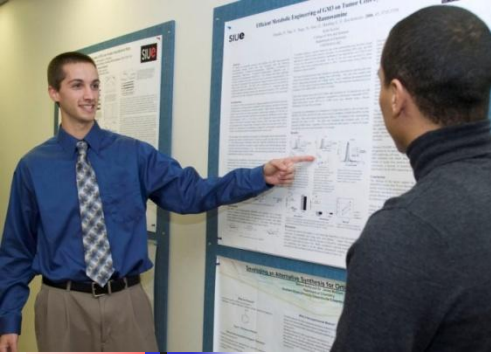
# Technical Presentations Skills for Engineers

## Communication technical information to non technical people

## Technical Report Writing

By; Engr.Dr. Attaullah Shah





# Being engineers, we are Technical Communicator.

- Engineering is a people-oriented profession.
- Engineering verdicts are given more attentions
- Engineers are exposed to relatively more public dealings.
- Engineers not only develop technologies; they help people make use of technology.
- Engineers must communicate with *regulators, funding agencies, suppliers, clients, customers, the media*, and sometimes the *general public*.



# **You must *communicate* your subject-matter expertise.**

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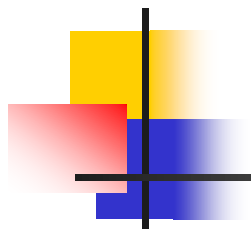
- **Engineers communicate their methods, results, conclusions, and recommendations so that information can be understood and *used* by a variety of people.**
- **Engineers generate raw data and then turn them into *information* to help people solve problems.**



## For instance . . .

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- If you are deputed at a site Engineer for a construction project, you have to deal with a broad spectrum of clients:
  - With structural Engineer about detailed drawings and clearing ambiguities in the construction drawings
  - With procurement officer for timely supply of material
  - With Lab Engineer to timely arrange the tests
  - With sub contractor for timely availability of human resource.
  - Many more people in the line



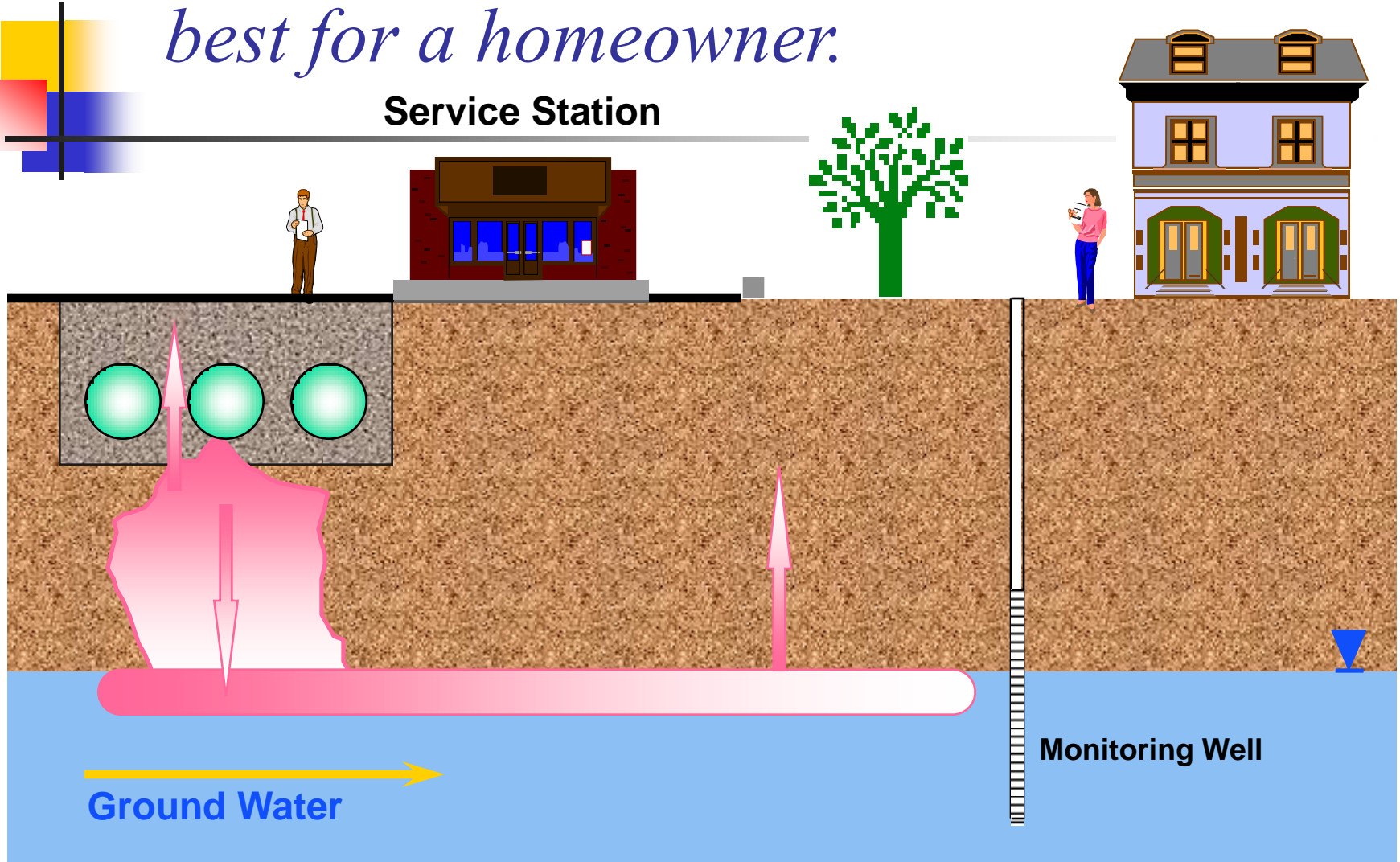
For which audience is this table appropriate: supervisor or homeowner?

Phenols and Metals: Summary of Maximum Contaminant Concentrations and Human Health Criteria (all Units in ug/L)		
Chemical	Maximum Safe Concentration	Found in Ground Water
Total Phenols	3,500	15,000
Metals		
Beryllium	0.037	15.000
Cadmium	10.000	770.000
Chromium	50.000	44.000
Mercury	0.144	0.400
Nickel	13.400	18.000
Lead	50.000	46.000
Thallium	13.000	93.000

*A picture might work  
best for a homeowner.*

**Service Station**

**Residence**





# Data alone are usually not useful.

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*Information* is data made useful for other people.





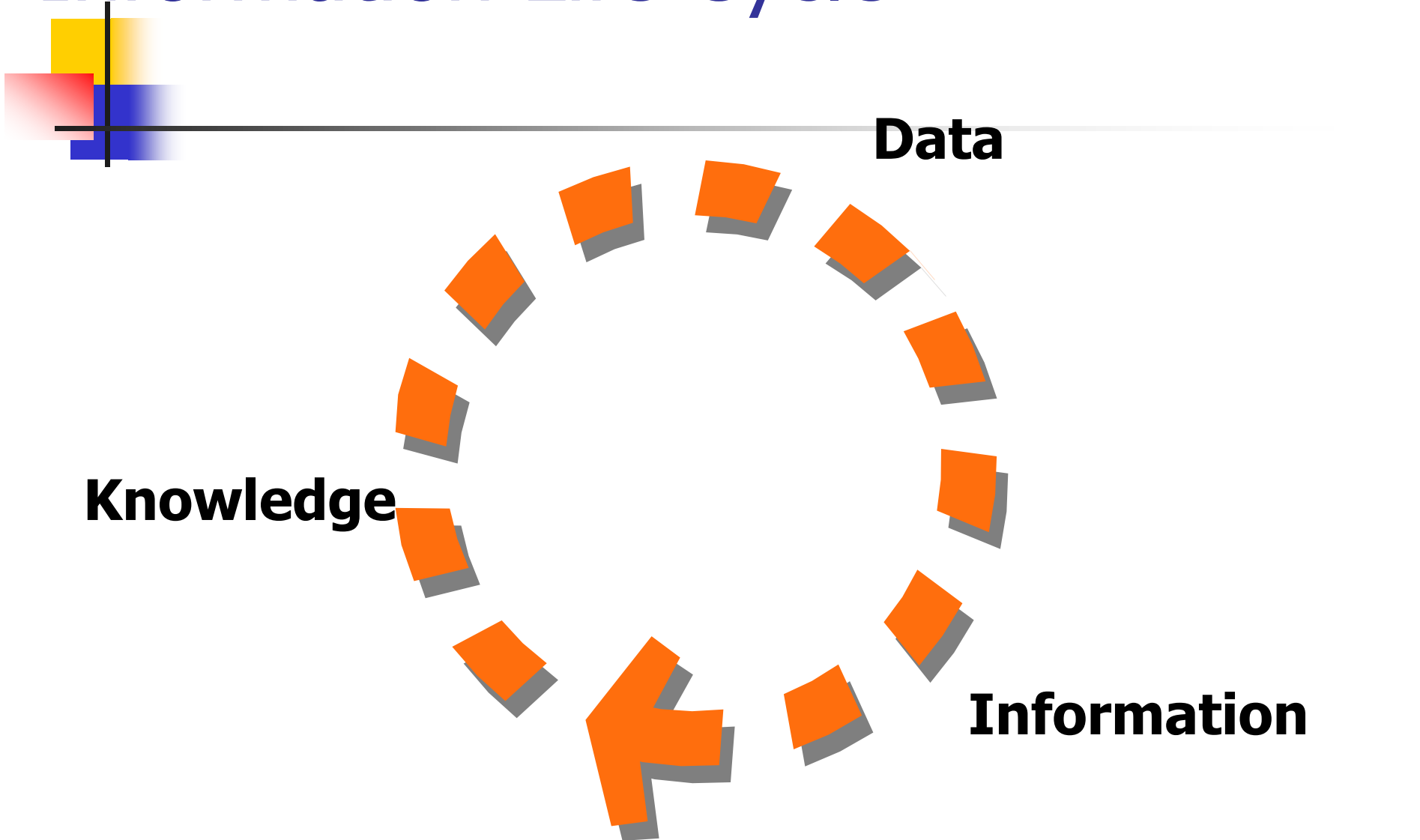


# Information life cycle

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- Data are what we record, observe, copy.
- Information is data that have been synthesized, put in context, and made meaningful.
- Knowledge is enough information to allow you or someone else to do something that produces new data or information.

# Information Life Cycle



# Necessary Skills for Engineers



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- **Manage information**
- **Write technical information for many audiences -- often with conflicting needs**
- **Design graphics for technical information**
- **Elicit expert information – interview others**
- **Present information verbally**
- **Work collaboratively -- write collaboratively!**

# Engineering documents you may be involved in writing

- **Progress reviews and reports**
- **User manuals -- software and hardware**
- **Training materials**
- **Guidelines and reports**
- **Safety policies and instructions**
- **Technical proposals**
- **Technical reports**

The last two types bridge the gap between the workplace and the academy.





# Academic writing

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- **dissertation proposals**
- **theses**
- **dissertations**
- **journal papers**

**and technical presentations**

- **oral presentations**
- **posters**

**as well as proposals and reports.**



# Audiences

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- Academic audiences
  - **other researchers**
  - **faculty**
  - **students**
  - **supervisor – now only!**

Even academic audiences have varying degrees of expertise and knowledge. And everyone is busy and reads fast!



# Research Audiences

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- **Experts**
- **Executives/Managers**
- **Technicians**
- **Regulators**
- **Funding Agencies**
- **General public**
- **Combination**

*Now* your audience is “expert,” but *later* to whom may you have to present results?



# Business Audiences

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- Inside the organization:
  - **Management**
  - **Colleagues**
  - **Support staff**
  - **Salespeople**
  - **Technicians**
- Outside the organization
  - **Customers**
  - **Regulatory agencies**
  - **Financial institutions**
  - **Suppliers/vendors**
  - **News media**





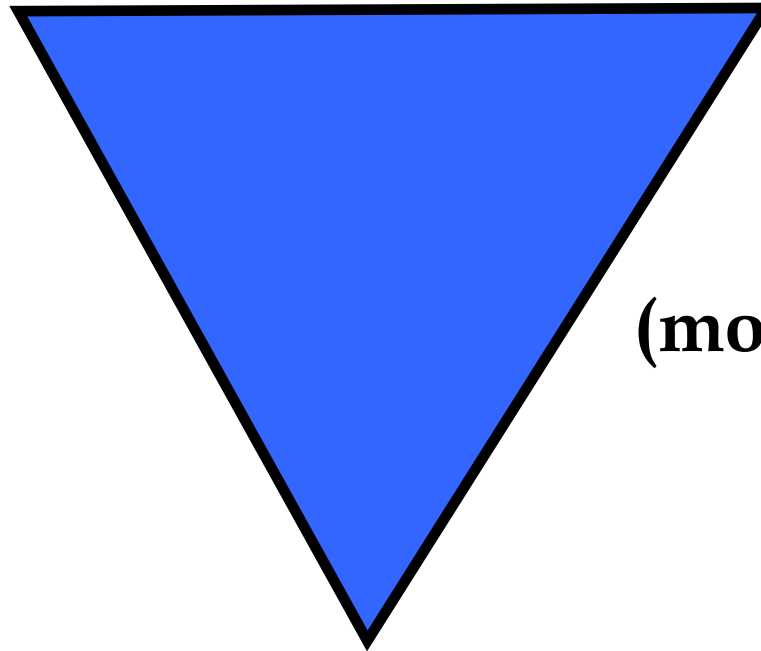


# Communicator's Triangle

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**Communicator**

**Audience**



**(most difficult)**

**Subject**



# Multiple Audiences

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- Different parts of the document are geared toward different audiences
  - Abstract – technical public
  - Introduction – interested public
  - Bulk of paper – researchers and subject-matter experts

# Writing Process and Planning:



You organize for yourself (outlines, etc.), **and** you organize the document for the *reader*.

# First, organize for yourself.

Feel like a tiny child  
when it comes to  
writing?

Most people do.  
Here's how to help  
yourself.



# 1. Recognize that writing is problem-solving

- As a *product*, writing solves problems for your audience
- As a process, it solves problems for **you!**



# You can use writing to help answer many critical questions:



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- What is it you really want to say?
- What will convince your audience?
- What data or information do you still need to collect?
- When you explain your methodology, what gaps are still there?

## 2. Recognize that writing is a *process*.



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- Defining objectives
- Planning
- Drafting
- Evaluating
- Revising

**Learn to separate these stages!**

# **You cannot collapse these stages together!**

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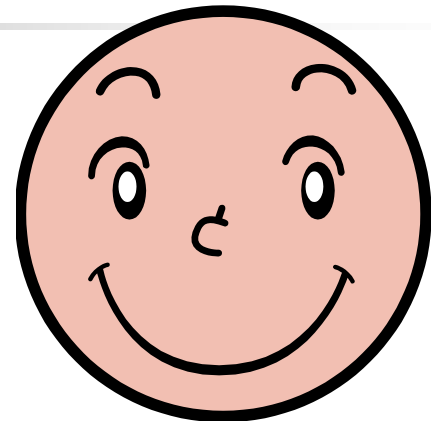
**You can't get  
it right the  
first time  
around!**





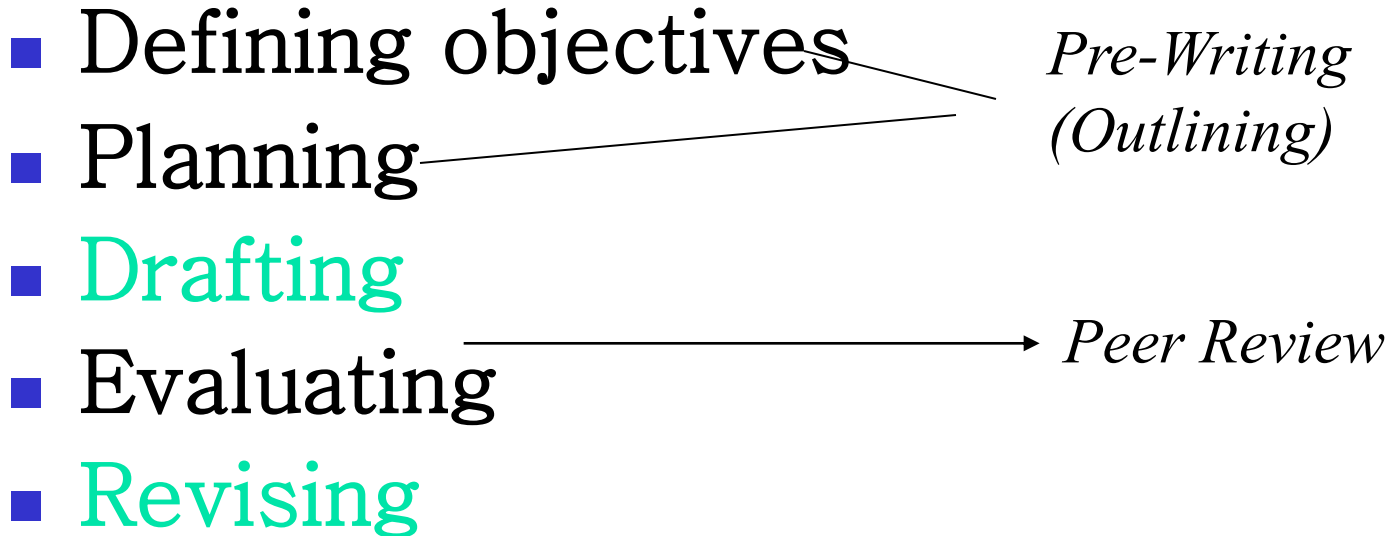
# Manage the writing process.

- Start early
- Manage your time
- Learn to draft – avoid need for perfection at this stage
- Learn to separate the **creative** and **critical** parts of your personality.



# Managing the Process of Writing

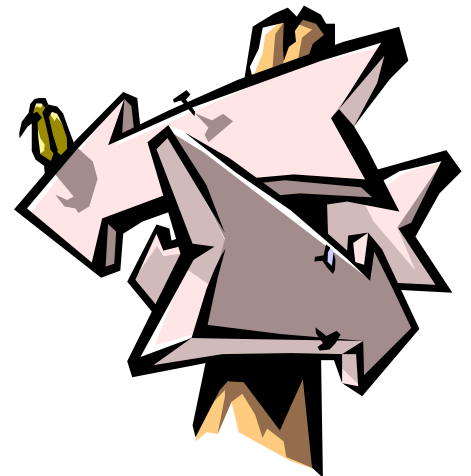


- Defining objectives
  - Planning
  - Drafting
  - Evaluating
  - Revising
- Pre-Writing  
(Outlining)*
- Peer Review*
- 

### 3. Realize that writing activities are incremental and iterative.

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- Move back and forth between doing research/engineering work and doing writing.
- Writing helps you understand what you really know and what you are still unsure about. Helps you plot *direction*.



# Sequence of Drafting



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1. **Write draft of Introduction**
2. **Write draft of Methods**
3. **Write draft of Literature Review**
4. **Write draft of Results**
5. **Write draft of Conclusions**
6. **Revise Introduction**
7. **Revise middle three chapters**
8. **Revise Conclusions**
9. **Revise Introduction**
10. **Write Abstract**

But I still have a hard time  
beginning to write!!



# Planning your Document: Organizing for *Yourself*

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Most people begin planning their document by creating an outline.

Don't be trapped by your outline! Any outline evolves constantly until the document is sent or published.

# Planning Tools: Many kinds of outlines and lists



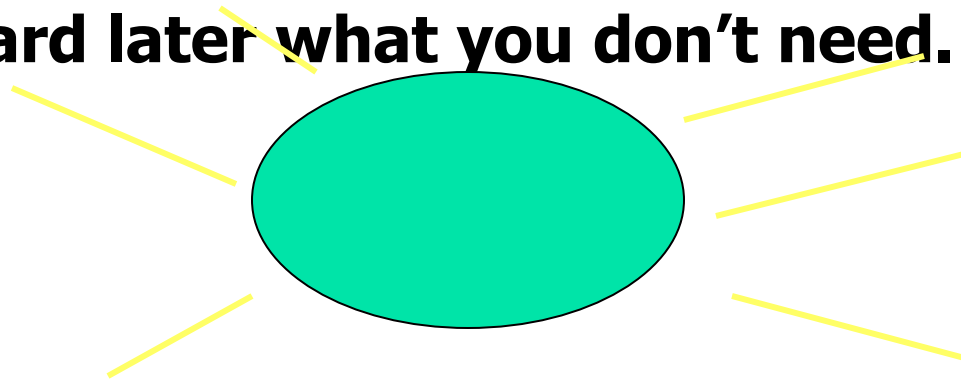
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- Doodles and lists of keywords
- Topic Outline
  - **Can become headings for your document. Eventually, becomes the Table of Contents.**
- Sentence Outline (helps connect topics)
  - **Helps writers refine ideas and link them together:**
    - “*Transistors have been around a long time.*” -- eventually that sentence becomes a heading:  
*History of Transistors*

# Brainstorm Outline: how it works

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- **Draw an oval**
- **Write document's central purpose in center**
- **Think of all related ideas, facts, descriptions**
- **Write these in spokes around oval**
- **Don't prioritize or sequence ideas until later**
- **Discard later what you don't need.**





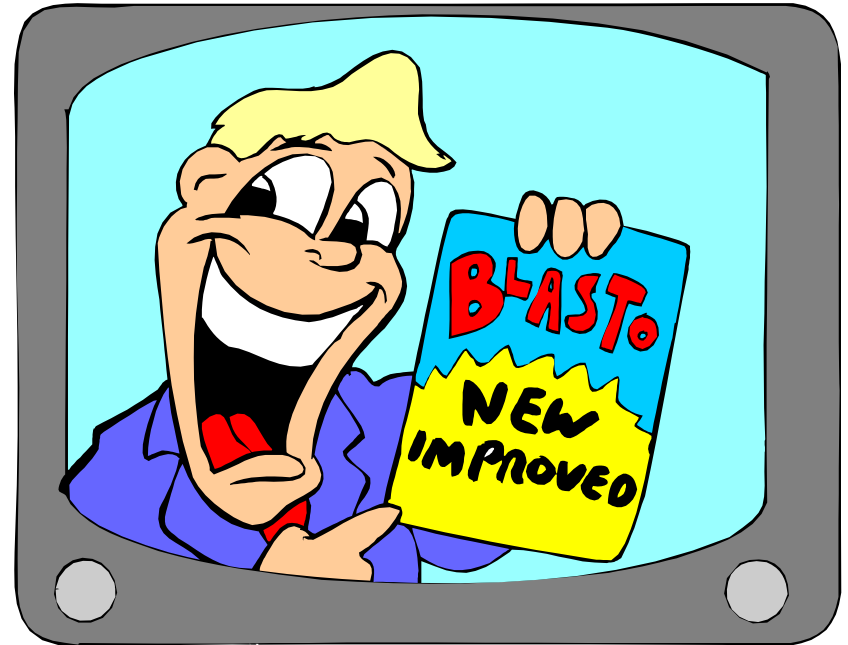
# The Elements of a Successful Technical Proposal

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# # 1: The title

- Choose a title that conveys information about your project.
- Avoid acronyms that have negative connotations.
- Make it Brief



## # 2: The abstract

- This is the first (and could be the only) part of the proposal that a busy reviewer will see.
- The abstract should be a map of the rest of the proposal.
- Write the abstract last to make sure it reflects the final version of the proposal.





# # 3: Problem statement

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- Provide a clear objective statement of the problem.
- Describe the factors that have contributed to the problem.
- Describe what has and has not worked in the past.
- Indicate what needs to be done (by you) now.

# # 4: The rationale

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Never assume the  
proposal reviewer  
knows what you know.

Convince the reviewer  
that the problem is  
**IMPORTANT!**





# Persuasive rationales

Describe how the project will...



- Resolve theoretical questions
- Develop better theoretical models
- Influence public policy
- Improve teaching/learning
- Improve the way people do their jobs in a particular field
- Improve the way people live

## #5: Literature review

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Display your awareness of the problem or need as well as the contributions that have been made by others—some of whom may be reviewers of your proposal!



# Show you understand the problem!



- Use the Funding Agencies “Terms” and “Vocabulary” to Describe the Problem.
- Provide the most recent data and/or information about the problem.
- Describe the gaps and contradictions that currently exist.



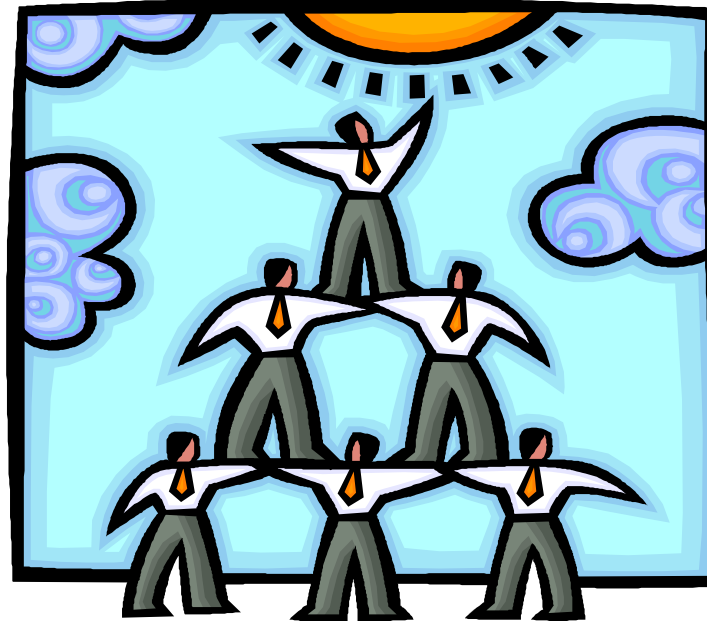
# Show you know the solution!

- Describe a solution to improve the situation.
- Back up your solution with data if possible.
- Quote or cite well known authorities on the topic.



## # 6: Project design

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Goals, Objectives and Activities Should Always  
Relate to One Another

# Program elements

Goals:  
Broad Statements of Intent



Objectives:  
Measurable Outcome Statements

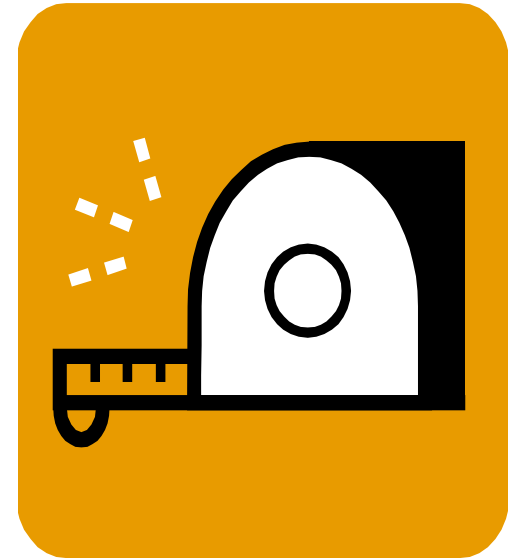


Activities:  
Implementation Steps

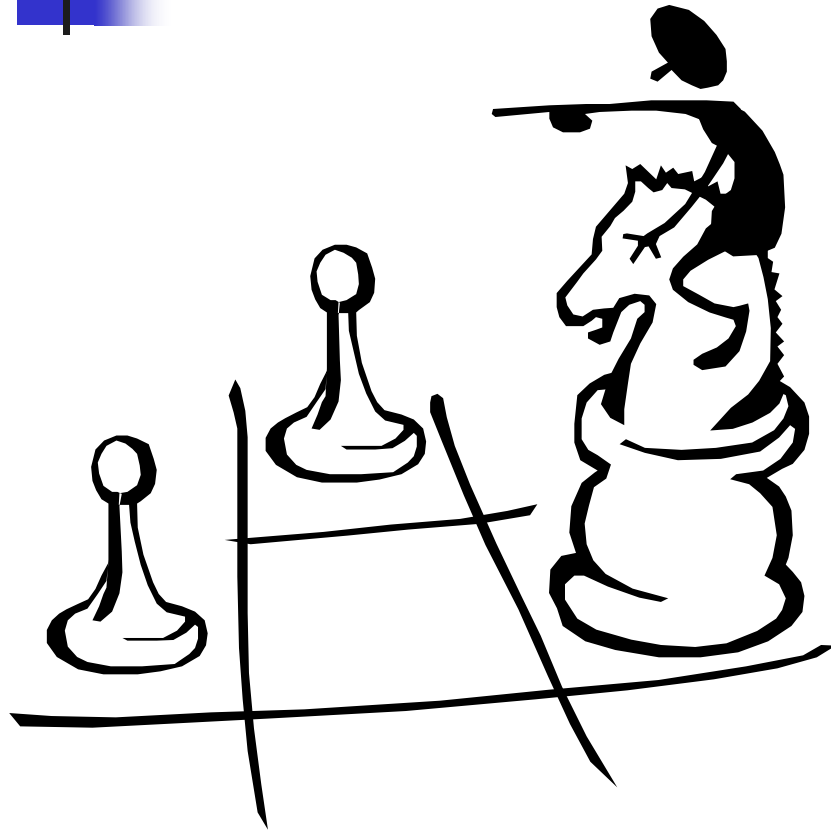


# Well written objectives

- State Who is Responsible
- State What is to be Accomplished.
- State When the Objective should be Accomplished
- State a Criterion for Success



# Well written activities



- Focus on How the objective is to be accomplished.
- Use “Action” words, e.g., recruit, analyze, evaluate, disseminate

# Research methods

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- State your research questions clearly
- Choose an appropriate research design
- Detail all procedures
- Control for validity and reliability
- Describe limitations
- Answer reviewers' questions before they are asked!

# # 8: Key personnel

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Describe the people that will help to make decisions in how the project is carried out.

Provide a description of their background, training, and expertise.

Highlight everyone's accomplishments—this is not the time to be modest!



# # 9: Facilities & resources

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Describe where the project will be conducted.

Describe any special equipment or resources you will have access to.

Describe any special capabilities or experiences possessed by your agency to carry out the project.





# # 10: Budget

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Ask for the funds that you need to be successful, but do not pad your budget.

Be aware that proposal reviewers know how much things cost!

If you ask for too little money to do the work you propose, you will appear naïve and inexperienced.



## # 11: Time lines

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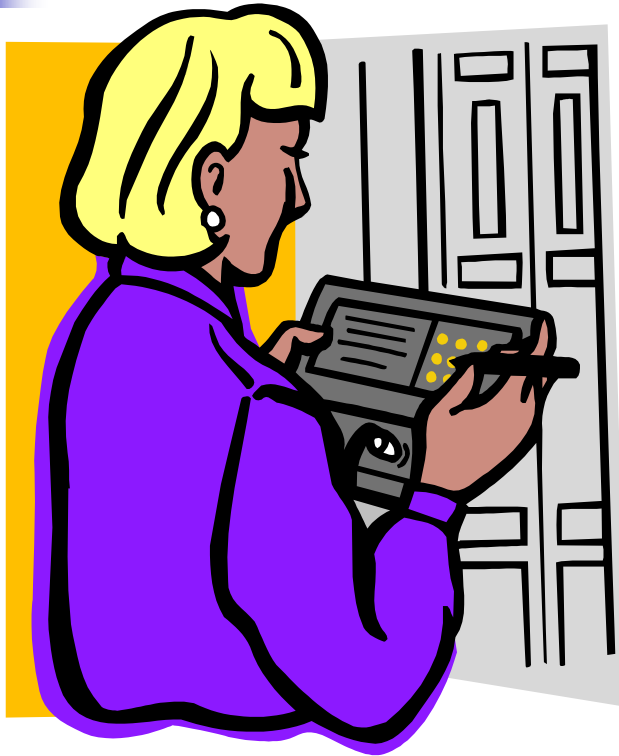
Sponsored project activities can take longer than anticipated.

Do not propose to do too much in any given project period.

Develop a time line for the reviewer.



## #12: Evaluation



- Describe how you will find out if your project is working.
- Describe how you will know if you have succeeded when the project is over.
- Describe how you will adjust your procedures and timelines to deal with real life events.
- Tell the proposal reviewers who will conduct the evaluation and review the information collected.

# #13: Dissemination

- Inform the proposal reviewers of the dissemination strategies that you will use and the audiences that will receive information on your findings.
- Information about your project can be disseminated via articles in peer reviewed journals and presentations at professional conferences.





# #14: Continuation funding

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- Sponsored Projects are of limited duration, e.g., 1 to 3 years
- Plan your next project before the current project ends!

# #15: Follow through

- Keep your program officer in mind: send copies of all publications and media coverage related to your project.
- Network with others: Look for ways to collaborate on future projects.

